

Research Note

Neotropical Monogenoidea. 22. Variation in *Scleroductus* Species (Gyrodactylidae, Gyrodactylidae) from Siluriform Fishes of Southeastern Brazil

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**ABSTRACT:** Specimens of *Scleroductus* are reported from the external surface of 4 siluriform catfish, *Glanidium melanopterum* Ribeiro (Auchenipteridae), *Parauchenipterus striatulus* (Steindachner) (Auchenipteridae), *Pimelodella* sp. (Pimelodidae), and *Rhamdia quelen* (Quoy and Gaimard) (Pimelodidae), collected from the Rio Guandu near Rio de Janeiro, State of Rio de Janeiro, Brazil. These reports represent new host and locality records for *Scleroductus* species in the Neotropics. Morphometric variability of the haptor anchors and hooks of specimens from respective hosts and additional diagnostic characters for the genus are presented.

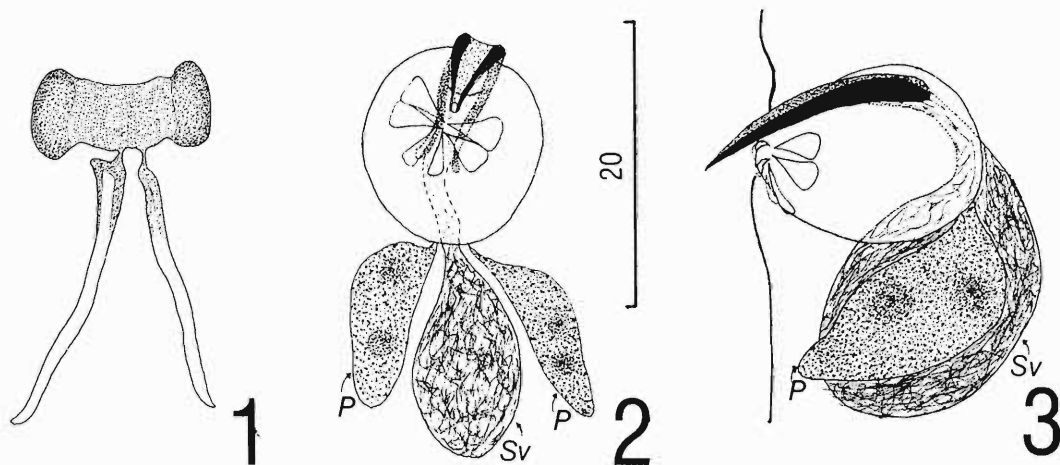
**KEY WORDS:** Monogenoidea, Gyrodactylidae, Brazil, morphometric variability, *Scleroductus* species, *Glanidium melanopterum*, *Parauchenipterus striatulus*, *Pimelodella* sp., *Rhamdia quelen*.

Jara and Cone (1989) proposed *Scleroductus* (Gyrodactylidae) for the viviparous *S. yuncensi* Jara and Cone, 1989, from the external surface of the pimelodid catfish, *Pimelodella yuncensis* Steindachner, in Peru. The genus was characterized by species possessing a bulbous male copulatory organ armed with a terminal spinous ring and 2 sclerotized ribs originating within the ejaculatory duct.

As part of a survey of neotropical Gyrodactylidae, specimens attributable to *Scleroductus* were found on the external surfaces of 4 species of catfish (Siluriformes): *Glanidium melanopterum* Ribeiro (Auchenipteridae), *Parauchenipterus striatulus* (Steindachner) (Auchenipteridae), *Pimelodella* sp. (Pimelodidae), and *Rhamdia quelen* (Quoy and Gaimard) (Pimelodidae). Fish hosts were caught by throw or gill net from below a rapids on the Rio Guandu near Rio de Janeiro, State of Rio de Janeiro, Brazil, between 1 January 1991 and 13 June 1991 (all new host and locality records). Individual or pooled specimens of each host species were placed in containers containing a 1:4,000 formalin solution for removal of parasites (Putz and Hoffman, 1963).

After 1 hr, the vials were vigorously shaken, and sufficient formalin was added to increase the concentration to 5%. Some helminths were mounted unstained in Hoyer's or Gray and Wess's medium for study of sclerotized structures. Other specimens, stained with Gomori's trichrome (see Kritsky et al., 1978) or Mayer's carmine, were mounted in permount for determination of internal anatomy. In addition, 2 paratypes of *Scleroductus yuncensi* (USNM 80630) were examined. Measurements, all in micrometers, include the average followed by the range and number (*n*) of structures measured in parentheses; dimensions of the anchor are shown in Figure 7. Helminths collected during the survey were deposited in the collections of the University of Nebraska State Museum (HWML 37317, 37318, 37319, 37320), the U.S. National Museum (USNM 83733, 83734, 83735, 83736), and the Instituto Oswaldo Cruz (*Scleroductus* sp. from *Glanidium melanopterum*; IOC 33154, 33146, 33147, 33148, 33149; from *Rhamdia*: 33150, 33151, 33152, 33155; from *Parauchenipterus*: 33153; from *Pimelodella*: 33145, 33156).

Although general morphology is similar to that of *Gyrodactylus* spp., *Scleroductus* appears justified based on the derived male copulatory organ. The elongate spine originating within the copulatory bulb and serving as a distal conduit for sperm appears to be a synapomorphy for the genus (Figs. 2, 3). Jara and Cone (1989) indicated that 2 ribs (each representing thickened lateral margins) of the spine originate within the ejaculatory duct, but stained specimens we studied show that the spine lies along the duct. The thick edges of the spine are united medially by a thin sclerotized membrane; they are fused distally (external to the bulb) to form a short tube through which sperm are apparently ejected. The male copulatory organ has 6–8 overlapping spinelets



Figures 1-3. Superficial bar and terminal male genitalia of *Scleroductus* sp. from *Rhamdia quelen*. 1. Superficial bar. 2. Male genitalia (ventral). 3. Male genitalia (lateral). All figures are drawn to the 20  $\mu$ m scale. Abbreviations: P = prostate, Sv = seminal vesicle.

that comprise the "horseshoe-shaped spinous ring" described by Jara and Cone (1989); 2 prostates and a single seminal vesicle empty via short ducts into the base of the copulatory bulb (Fig. 2).

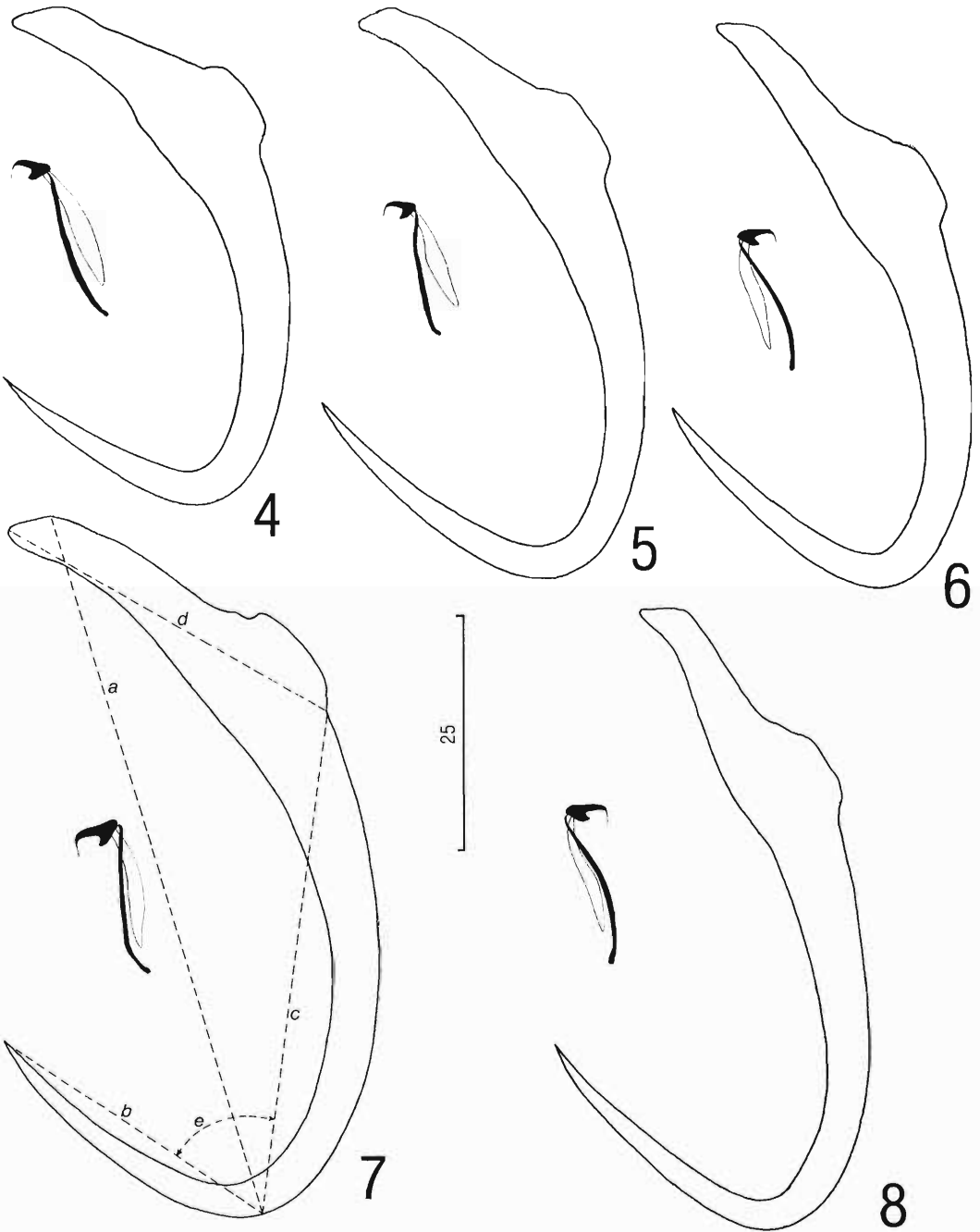
In addition to characteristics provided in the generic diagnosis of *Scleroductus* by Jara and Cone (1989), we note the following from specimens collected in Brazil: Eyes absent; cephalic glands unicellular, comprising bilaterally paired groups of prepharyngeal, pharyngeal, and post-pharyngeal dorsal glands and single bilaterally paired group of posteroventral glands (antero-ventral glands not observed) (see Kritsky, 1978); pharynx composed of 2 tandem subhemispherical bulbs; testis postgerminal. *Scleroductus* species appear specific to siluriform fishes of the Neotropics.

Morphology of the anchors, hooks, and bars of specimens collected from respective Brazilian hosts and that of *S. yuncensi* are strikingly similar (Figs. 1, 4-8). The deep bar is variably bent and rod-shaped. The superficial bar is platelike with expanded terminations; its shield is represented by 2 bilaterally flattened posterior projections that parallel the shafts of the anchor (Fig. 1). The ventral anchor possesses an elongate superficial root, a basal knob, a delicate evenly curved shaft, and elongate point and lacks a basal fold (Fig. 4-8). The hooks have an extrahamular distribution in the haptor (Kritsky and Mizelle, 1968); each possesses a delicate shank, elongate fine

point, a ventrally sloping shaft, and small base with upright truncate toe and rounded heel; the hooklet is usually flexed ventrally. Some of these features, particularly those of the anchors and shield of the superficial bar, may also provide diagnostic synapomorphic characters for the genus.

Comparative measurements of the anchors and hooks of specimens from respective hosts, including those of *S. yuncensi*, are provided in Table 1. Greatest variability in size among specimens from respective hosts is seen among the anchors, with those of specimens from *Rhamdia quelen* occupying the lower limit and those of *S. yuncensi* the upper limit. ANOVA followed by the Tukey test for significance ( $P < 0.05$ ) indicate existence of 3 forms based on dimensions of the anchor (except point length and angle). The anchors of worms from *R. quelen* are different (smallest) from those off *Pimelodella* sp., *Glanidium melanopterum*, and *Parauchenipterus striatulus*, and the anchors of both groups are different from those of *S. yuncensi* (largest).

Because of the morphologic redundancy of the anchor, bar, hooks, and male copulatory organ of specimens from Brazil and Peru, we have chosen not to assign our specimens to *S. yuncensi* or to describe them as new species. It is unknown whether the observed variations in morphology and size are of specific value or are results of influences of host and/or environmental factors. In any case, if our specimens are indicative of



Figures 4–8. Anchors and hooks of *Scleroductus* species from 5 siluriform hosts. 4. *Scleroductus* sp. from *Rhamdia quelen* (Brazil). 5. *Scleroductus* sp. from *Glanidium melanopterum* (Brazil). 6. *Scleroductus* sp. from *Pimelodella* sp. (Brazil). 7. *Scleroductus yuncensi* from *Pimelodella yuncensis* (Peru). 8. *Scleroductus* sp. from *Parauchenipterus striatulus* (Brazil). All figures are drawn to the 25  $\mu\text{m}$  scale. Figure 7 shows measurements taken for the anchors: a = total length, b = length of point, c = length of shaft, d = length of base, e = angle point/shaft.

Table 1. Comparative measurements of *Scleroductus* species from Brazilian and Peruvian siluriform hosts.

	Hosts							
	<i>Glanidium melanopterum</i>	<i>N</i>	<i>Rhambdia quelen</i>	<i>N</i>	<i>Parauchenipterus striatulus</i>	<i>N</i>	<i>Pimelodella yuncensis</i> *	<i>Pimelodella</i> sp. <i>N</i>
Anchor								
Length	65 (64–68)	8	58 (54–60)	13	64 (60–70)	17	78–79	20
Shaft	44 (42–45)	8	39 (38–41)	11	43 (37–45)	16	56	20
Point	31 (30–33)	8	26 (24–27)	12	31 (26–33)	16	35	20
Base	30 (29–32)	8	28 (26–29)	12	31 (28–33)	16	40 (39–42)	19
Angle	60 (50–74)	8	68 (64–71)	11	61 (53–76)	14	67 (63–70)	19
Hook								
Length	17 (16–18)	5	18 (17–21)	9	17 (16–19)	12	17	15
Hooklet	5	5	5	11	5–6	13	5–6	17

\* Specimens measured from this host are the 2 paratypes of *Scleroductus yuncensis*.

the variability among species in the genus, specific determination based on morphometrics will be difficult.

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